

RAIN GARDENS

A Tool for Ecological Restoration

And Improved Water Quality

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Master Recycler, Michigan Conservation Steward*

Rain Gardens as a Tool for Ecological Restoration

Overview

- What Rain Gardens do & Why they are Needed
- What Rain Gardens are & are NOT
- Where it All Began
- Planning & Building a Rain Garden
- Rain Gardens in SE Michigan

What Rain Gardens do & Why they are Needed

What Rain Gardens do & Why they are Needed

Rain Gardens Work by

- Reducing the Speed & Volume of Stormwater Runoff Entering Lakes & Streams (Surface Water)
 - Reduces Erosion
 - Reduces Scale of Infrastructure Required to Handle Major Rain Events (e.g. Retention Basins)
- Recharging Aquifers (Ground Water) via Infiltration
 - Helps Offset Impervious Surfaces Nearby
 - Keeps Rain Near where it Falls

What Rain Gardens do & Why they are Needed

Rain Gardens Work by

- Improving the Quality of Water Entering Surface & Groundwater Sources (Purification)
 - *Mechanically* Filters Runoff to Reduce Pollutants before Entering Surface Water
 - *Chemically* Filters Runoff to Reduce Pollutants before Entering Groundwater
- When Planted with Native Flora, they also Increase Biodiversity & Attract Wildlife

Why is Stormwater Runoff an Issue?

There's as much Rain Falling Now as
When the Land was Undeveloped



What Rain Gardens do & Why they are Needed

How can Rain Gardens Help?

- Reduce Erosion
- Lessen Impact of Pollutants
- Restore Ecology by Improving the Health of Waterways
- Increase Biodiversity & Sustain Wildlife



Sources of Pollution in Lakes & Streams Include:

- Soil Erosion
- Fertilizer & Pesticide Runoff
- Animal Wastes
- Runoff from Roads

What Rain Gardens are & are NOT

What Rain Gardens are & are NOT

A Rain Garden is...

- A Shallow Depression in the Landscape
- Usually Located Downhill from Source of Stormwater Runoff
- Designed to
 - Capture, Filter, & Recycle Runoff
 - Reduce Stormwater Loads on Storm Drains & Waterways

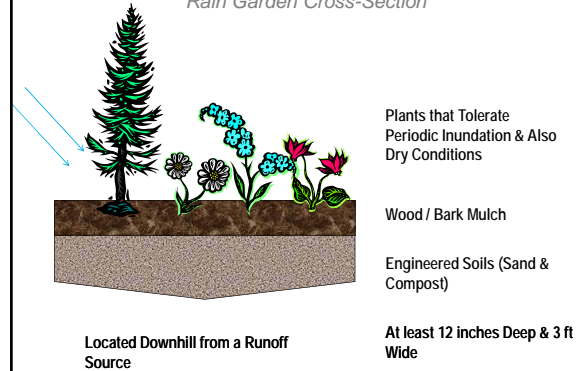
What Rain Gardens are & are NOT

A Rain Garden...

- Collects & Recycles Rainwater Close to Where it Falls
 - Holds Water Only for a Short Time (2-48 hours)
 - Returns to a Dry Garden After Rain Event

*A Rain Garden is **NOT** a Pond, Water Garden,
Wetland, or Retention Basin!*

Rain Garden Cross-Section



Features that are Raised or Designed to Shed Water are not a Rain Garden. However, a Rain Garden could be Located Downhill from this Lawn.



Where it All Began

Where it All Began

Pioneering Rain Garden Work

- Watershed Restoration Programs around Chesapeake Bay
- Shared Many of the Same Problems as the Great Lakes





Rain Gardens Installed as Part of Subdivision Design
Help Protect the Chesapeake

Where it All Began

Pioneering Rain Garden Work

- Expanded to the Great Lakes via Minnesota & then Wisconsin before Coming to Michigan



Rain Gardens Installed by City of Maplewood (near St. Paul)
as Part of Street Replacement Project



Rain Garden at Street Corner
Planted with Low-Maintenance Day Lilies

Where it All Began

Bringing Rain Gardens to Michigan

- First Rain Garden in Detroit area was at Belle Isle Zoo (All Natives)
- Since the Late-1990s, SOCWA has Championed them in SE Michigan
- Programs have also Spread to Grand Rapids and are Expanding throughout the State

Where it All Began

Adapting Rain Gardens to SE Michigan

- "Recipe" for Rain Garden Construction had to be Modified for SE Michigan Soils
 - Native (Heavy Clay) Soils were Poor at Infiltration so Required Removal & Replacement with a Compost / Sand Mix
 - Our Alkaline pH Inhibited Bacterial Breakdown of Pollutants, Requiring Amendment with Compost

Planning & Building a Rain Garden

Planning & Building a Rain Garden

Basic Steps

- Pick a Location
- Check Soil Drainage
- Decide on Basic Look / Feel
- Note Cultural Conditions
- Select Plants
- Excavate
- Test & Install Plants
- Provide Care & Maintenance

Planning & Building a Rain Garden

Pick a Location

- Placed Downhill from but Close to a Source of Runoff
 - Roofs and Downspouts
 - Sump-Pump Hose
 - Driveway, Road, or Parking Lot

Planning & Building a Rain Garden

Pick a Location

- May be Appropriate for Front or Back Yard
- Often an Existing Bed can be Expanded or Converted to a Rain Garden

Design with the End in Mind. Consider a Location where the View can be Enjoyed!



Planning & Building a Rain Garden

Check Soil Drainage

- Check on Site Infiltration
 - Dig a Test Hole 1-ft Deep
 - Pour Water in it Several Times
 - Time How Fast it Drains
- Rain Gardens should be Sized to Handle Water Flow (*Equations have been Developed to Calculate Size Needed*)

Planning & Building a Rain Garden

Decide on Basic Look / Feel

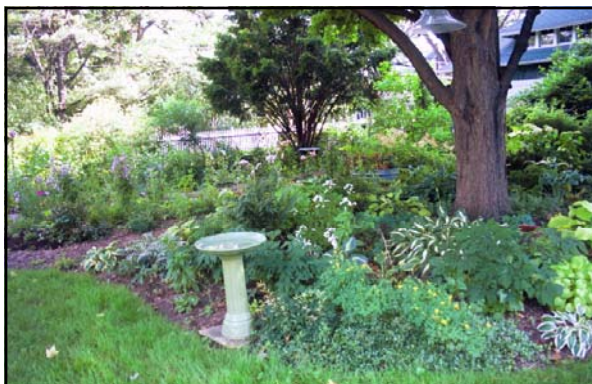
- Determine "Character" of Garden
 - Formal
 - Semi-Formal
 - Naturalized
- Curved Shapes Seem to Look Best



Rain Gardens can have an Informal Naturalized Look



This Rain Garden is Shady & More Formal



This Woodland Rain Garden is Shady & Semi-Formal

Planning & Building a Rain Garden

Note Cultural Conditions

- Should Guide Plant Selection (*Right Plant / Right Place*)
 - Sun / Shade
 - Wind
 - Type & pH of Soil

Easier to Select Plant to Match Local Cultural Conditions than Try to Change Conditions to Accommodate Plant

Planning & Building a Rain Garden

Select Plants

- Besides Local Cultural Conditions, Select Plants that Tolerate Periodic Inundation (*Wet Feet*) & then Drying Out Again
 - Michigan Native Plants Fare Better than Many Cultivars, but Not All Natives will Thrive in a Rain Garden
 - Look for Species that Typically Grow in the Floodplain, as they Better Tolerate Wet / Dry Conditions

Planning & Building a Rain Garden

Excavate

- Dig Out Native Soils (May Need Heavy Equipment)
 - If Heavy Clay, Excavate at Least 12-in. Deep & 3-ft. Wide
 - Reuse Native Soil to build Berm around Back of Bed to Keep Water from Overflowing in a Heavy Rain Event

Planning & Building a Rain Garden

Excavate

- Replace Native Soil with Mix of 60% Compost + 40% Sand
 - Compost Provides Nutrients for Plants & Host Microorganisms that Help Break Down Pollutants
 - Sand Allows Water to Infiltrate into Underlying Aquifer
 - Some Top Soil (without Clay) May also be Used
 - Blend Soil Mix Well, then Level

Planning & Building a Rain Garden

Excavate

- Top with Natural Mulch to Protect Plants, Reduce Weeding, Reduce Evaporation in Dry Weather, & Trap Sediment During a Rain Event
- A Turfgrass Buffer Around Garden Provides Additional Erosion-Control Benefits

Planning & Building a Rain Garden

Test

- Once Garden is Installed, Let Settle, then Test for Water Infiltration

Aquarium Rule: Check Water Flow & Infiltration Rate after a Rain to Ensure Garden is Working before Adding Plants

Planning & Building a Rain Garden

And Test Again

- Even After it is Planted, Observe Rain Garden Spring & Fall during Heavy Rains
 - Rain Garden should be Dry within 48 hr.
 - If Not, then More Work (to Improve Drainage) is Necessary for Plants to Survive – See *Aquarium Rule*
- Then Enjoy



Joe Pye Weed (*Eupatorium purpureum*)



Penstemon (*Penstemon digitalis*)



Purple Coneflower (*Echinacea purpurea*)



Blue Flag Iris (*Iris versicolor*)



American Cranberry Bush (*Viburnum trilobum*)



Dogwood (*Cornus sp.*)



Native Black-Eyed Susan (*Rudbeckia serotina*)



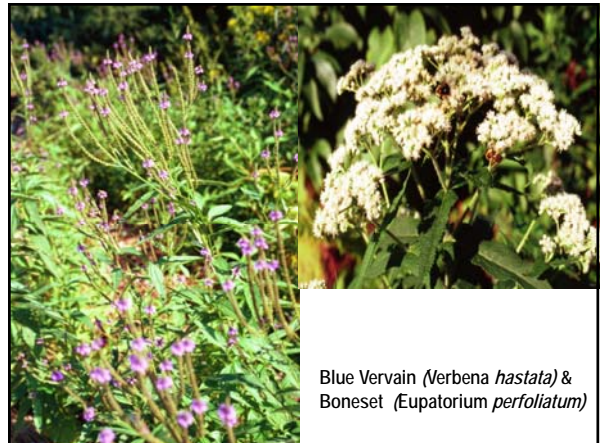
Spiderwort (*Tradescantia sp.*)



Blazing Star (*Liatris spicata*)



Swamp Milkweed (*Asclepias incarnata*)



Blue Vervain (*Verbena hastata*) &
Boneset (*Eupatorium perfoliatum*)



Blue Lobelia (*Lobelia siphilitica*) &
Nodding Wild Onion (*Allium cernuum*)



Sedum (*Sedum sp.*)



Asters (Aster sp.)

Planning & Building a Rain Garden

Care & Maintenance

- After Initial Planting
 - Mulch Reduces Weeds & Prevents Soil Erosion
 - Compost in Soil Mix Provides Nutrients – NO Additional Fertilizer Needed
 - Water When Dry Until Plants are Established (1-2 years)

Planning & Building a Rain Garden

Care & Maintenance

- Once Established
 - Water Only in the Driest of Seasons
 - Top-Dress with Fresh Mulch as Needed
 - Weed by Hand – Should be Minimal After Year 2
 - Dead-Head to Ensure More Blooms
 - Thin Native Plants as Needed



Properly Designed & Planted Rain Gardens Require Little Additional Work, Provides Years of Enjoyment, & Make Important Environmental Contributions

Rain Gardens in SE Michigan



Lathrup Village Community Rain Garden – Rock Infiltration Sump Installed to Remove Water Quickly



Lathrup Village Community Rain Garden – June 2004



Piotrowski Rain Garden, 28020 El Dorado Place, Lathrup Village



Does it Work? Piotrowski Rain Garden is Dry even when Front Drainage Swale is Wet



Ragalyi "Sump-Pump" Rain Garden was Created by Expanding an Existing Flower Bed



Ragalyi "Sump-Pump" Rain Garden, 28466 El Dorado Place, Lathrup Village



1 Year Later – Ragalyi "Sump-Pump" Rain Garden



Just Planted: Jerome Front Yard Rain Garden, West Bloomfield Township



After: Jerome Front Yard Rain Garden – September, 2004



Before: Bedford Street, Village of Beverly Hills, is a Good Candidate for a Neighborhood Rain Garden



After: Enjoying the Flowers in Beverly Hills Neighborhood Rain Garden



Before: Mallett's Creek Library, Ann Arbor – Opportunity to Filter Parking Lot Runoff Before it Reaches Nearby Stream



After: Bioswale Installed in Parking Lot at Mallett's Creek Library



After: Close-Up of Blue Vervain & Swamp Milkweed in Mallet's Creek Library Bioswale – Natural Beauty with a Purpose!



**Morris Adler
Elementary School,**
19100 Filmore Ave., Southfield

**Project Partners for
Garden Planning:**

- Teachers and Parents
- SOCWA Ecological Gardening Volunteers
- SOCRRA (compost)
- City of Southfield
- Southfield Public Schools
- Four Seasons Garden Center
- Jim Mackinder, Landscaper



Adler Elementary School Rain Garden, Southfield – May, 2004

Rain Gardens in Southeast Michigan

Building Community Connections

- Rain Gardens Make Excellent
 - Neighborhood or Subdivision Green Features
 - On-Going Educational Experience
 - Opportunity for Neighbors to Meet, Plan, Plant, & Maintain a Garden Together (Build Community Spirit)

Questions?